Stormwater CONNECTIONS

Spring 2004

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The United States Environmental Protection Agency estimates that Americans use an average of over four pounds of pesticides each year.

Below the Surface: Healthy Soils

Ask any experienced gardener. They'll tell you that healthy soil is worth its weight in gold. Why? Because a spoonful of healthy soil contains millions of beneficial organisms. This microscopic universe performs many important functions such as keeping disease-causing organisms in check, recycling and restoring nutrients and making them available to plants, promoting healthy root growth and providing pathways for the exchange of air and water. To sustain and keep these organisms happy, we must nourish them with a good source of food such as compost.

Healthy soil contains millions of different microrganisms that work together to keep disease and pests under control.

Soil can help protect water supplies and water quality. Deep, healthy soil stores rainfall, slowly releasing it to plants, streams, and groundwater. Soil also acts as a biofilter, capturing and holding potential pollutants in place so soil microbes can break them down. The result is fewer chemicals, less irrigation, fewer stream problems, cleaner water, thriving landscapes, less cost; everybody wins.

Soil organisms contribute to soil fertility by breaking down organic matter (dead plants and animal matter) thereby releasing nutrients into the soil. They help maintain soil structure and increase the efficiency of nutrient uptake by plants. When there is an outbreak of disease and pests in your garden, it generally means that your soil's bacterial immune system is out of balance. Treating disease or pests with chemicals can further damage this natural defense system, which may lead to an apparent need for more chemicals.

What can you do?

Start by determining what type of soil you have. Sandy soils contain large particles that feel gritty. Although they are loose and drain easily, they do not store water or nutrients for the plant. Silty soils contain particles of intermediate size, between clay and sand. Clay soils have tiny particles that feel sticky when wet and dry into dense chunks or fine powder. While they hold water and nutrients well, they drain poorly. Loamy soils are a mix of sand, silt, and clay. Loamy soils are generally loose, well-drained and able to store moisture and nutrients. Regardless of the kind of soil you have, they all will benefit by an addition of organic matter.

The best time to do this is before you begin planting. Enrich your soil by adding plenty of compost or other organic matter throughout the entire planting area. Thoroughly mixing these materials deep (about 6 inches) into the soil helps provide water, air and nutrients to plant roots and helps to hold nutrients in place. Signs of good compost are: smells rich like the earth; dark brown in color; fibrous texture (like peat); without weed sprouts, mushrooms or other growths. Keep in mind that different types of amendments may work best with certain soil types or plants. Check with a local garden center or composting facility to determine what the best choice is for your garden.

Organic fertilizers contain micronutrients such as boron, magnesium, etc. that are lacking in chemical fertilizers. Organics need not be frequently added. They gradually release nutrients through bacterial action as soils warm, when plant growth is most rapid.

CITY OF EUGENE STORMWATER MANAGEMENT PROGRAM

Stormwater Connections is published by the City of Eugene Public Works Department to enhance awareness of stormwater and related surface water management issues.

Editor: Kathy Eva
Designer: Sally Markos

EUGENE

City of Eugene
Public Works
Stormwater Management Program
858 Pearl Street
Eugene, OR 97401
kathy.a.eva@ci.eugene.or.us
(541) 682-2739

Ask Mr. Stormwater

Q: I've been using biodegradable soap to wash my car but a friend recently told me that even that could be harmful to the environment and shouldn't go down the storm drain system.

Biodegradable only means that the soap will degrade over time. All soaps and car wash products are still harmful to aquatic life even if they are biodegradable. To add to the problem, the dirt and grime that you wash off your vehicles contains various contaminants including heavy metals, hydrocarbons and other pollutants. The dirty wash water enters the storm drain system and does not receive any treatment prior to entering the Willamette River.

Where to wash

Wash your car in the driveway if it drains onto a lawn or flower bed or on a grassy or graveled area and avoid letting water run into the street drain, or hand-wash at a commercial car wash facility where wash water is either discharged to the wastewater treatment plant or cleaned onsite, recycled and reused for the next car wash. When you do wash at home, follow these tips:

- Use a spray nozzle that will automatically shut the water off when not in use.
- If you use soap, choose a biodegradable and phosphate free soap and use it sparingly.
- Dispose of leftover wash water onto your lawn, flower bed or into an inside drain.

Eugene fire stations now contain dual drainage systems

To help prevent contaminants from entering the stormwater system, Eugene's Fire & EMS Department is retrofitting all of its fire station sites with dual drainage systems. When the fire engines are being washed, drainage is simply switched over to the wastewater system, then automatically returned later to the stormwater system.

The retrofits are expected to be completed this spring. For the new fire station under construction downtown, and for the station to be built in the Santa Clara area, dual drainage is part of the design.

Fire & EMS personnel are also trained in proper response measures to contain stormwater pollution whenever there is a chemical spill or other hazardous runoff that threatens the stormwater system, a natural waterway or body of water within the department's response area.

Urban Landscapes

I passed them on an early afternoon in the beginning of February. They were cleaning up a garden bed in front of Campbell Senior Center, bordering Skinner Butte Park. She was kneeling down, hunched forward, plucking dead foliage from a plant, tossing it in a bucket. Barely ten feet away, he was removing unwanted debris from around the shrubs and protective layer of mulch. When I looked around, it was obvious what section they had already completed.

The people I'm referring to are park specialists who are part of a larger team from the City's park maintenance program. They tend to the array of flowers and greenery in parks, median strips, concrete planters, and beds along city buildings. They're passionate about the work they do and possess an impressive mix of skills, experience and knowledge. I've seen them throughout the year, working in a variety of weather conditions from hot, sunny days to cold, rainy weather. I admit that until recently, I've taken for granted these well-cared for places in my environment.

As many a gardener or landscaper can attest, keeping a healthy and attractive landscape requires planning and a thoughtful approach to handling pests, growth, and maintenance. For well over twenty years, parks staff have used Integrated Pest Management (IPM) as a tool in managing the vegetation in our cityscapes. One crew member summed it up in this way.

"IPM starts from the ground up. It is so important to have a healthy foundation to work from. Keeping the soils healthy allows one to substantially reduce or eliminate the use of chemical fertilizers and pesticides. A healthy garden and landscape is naturally resistant to pests, drought, weeds and disease. And, choosing hardy, native plants in the right growing environment is essential to any successful IPM program."

The goal of IPM is to *manage* pests and the environment to balance costs, benefits, public health, and environmental quality. By using current, comprehensive information on the life cycles of pests and their interaction with the environment and careful observation, staff can determine the best course of action to take. Here's an example that one landscaper described. There was an infestation of aphids on several Japanese maples in one downtown area that he'd been asked to check on. Upon his initial site inspection, he recognized that natural predator lady bugs were also present. The maples looked in good health so he decided he would monitor the plants. Over the next several weeks, the lady bug population grew. They, in turn, consumed the aphids and brought the problem under control. This landscaper's knowledge of pests and plants and approach to solving the problem made it possible to resolve the issue naturally.

While the IPM approach is not a quick fix, its users weigh out many options to managing the landscape. The use of alternatives and a "least is best" approach to chemical use is not only healthier for park users and park staff, it also protects water quality in our rivers and streams.

For more information about maintenance of our city parks, contact Sarah Medary, Parks Maintenance Manager with Parks and Open Space at 682-4800.

Park specialist tends to a garden bed near the Ferry Street Bridge.

Environmentally Friendly Lawns

Simple Steps Toward a Healthy Lawn

Healthy lawns are more resistant to disease, tolerate some insect and drought damage, and will out compete many weeds. Understanding good lawn maintenance practices will be healthier for you, your lawn and the environment. Follow these simple steps to give your lawn a good foundation.

Mow high and mow often, and let the clippings stay where they fall. Set your mowing height up to two inches for most lawns, and remove only the top third of the grass blade with each mowing.

Only fertilize while the grass is actively growing. Fertilize moderately in May and September with a "slow release" or "organic" fertilizer. Slow release fertilizers are less likely to leach into stormwater systems during a heavy rain. Fertilizers that release nitrogen too quickly cause rapid leaf growth at the expense of healthy stem and root growth. Overuse of these fertilizers also poses a threat to the quality of local ground and surface water. If fertilizing only once a year, fall fertilizing is the most important for developing strong root systems capable of supporting vigorous growth.

Water deeply and infrequently. Deep watering promotes deep root zones more capable of withstanding drought conditions. Water in the evening or early morning to avoid water loss due to evaporation.

Improve a poor lawn in four steps: plug aeration, topdressing with one inch of compost, overseeding with your existing lawn mix or a perennial rye/fine fescue mix, and fertilizing moderately with a slow release fertilizer.

Control weeds by pulling or spot spraying with the least toxic weed killer available rather than using a blanket "weed and feed" approach. (See page 5 for some simple recipes for non-toxic weed killers.) Crowd out weeds by encouraging healthy lawn growth.

Grasscycling

Grasscycling is the practice of leaving clippings on the lawn. Grass clippings contain all the essential nutrients for your lawn. By letting your clippings lie, you can reduce the fertilizer needs of your lawn and time spent mowing by 40%.

Grasscycling Tips

Mow every five to six days, or five times a month during the growing season. This increases grass shoot density, which inhibits weed growth. Keep mower blades sharp. Sharp blades will cut the clippings into smaller pieces. This also makes a cleaner cut which helps prevent tearing and browning of grass tips. Fit your regular mower with a "mulching blade" rather than purchasing a new "mulching mower".

It is a myth that grass clippings cause thatch. Thatch is the build up of roots and stems due to a poor or non-existent soil foodweb, and is commonly the result of compacted soil, shallow watering, and the use of quick release fertilizers. Encourage a healthier lawn with less thatch through grasscycling, aeration, compost topdressing, deep watering, and the use of slow release fertilizers.

Ecolawns are hardy and the interesting variety of plants thrive with less water and fewer chemicals.

The Ecolawn

An ecolawn is grown from environmentally friendly lawn seed mixture designed to use less water, fertilizer, herbicide and pesticide to keep it healthy and green. An ecolawn can take less time to mow and maintain and stays greener during hot summer months while also using less water than conventional lawns.

You can use a commercial blend found at many gardening stores or mix your own! A basic seed mix begins with low growing grasses, and may also include strawberry clover, yarrow, chamomile and sweet alyssum.

Here is an example of an ecolawn mixture:

60% Perennial Rye (elf variety)
17% Red Fescue
19% Hard Fescue
4% Strawberry clover
3% White Yarrow
1% Wild Flowers/Herbs

Maintaining an Ecolawn

Once an ecolawn is established, which may take up to a year, it requires less mowing, less fertilizer, and less frequent watering (but just as deep!). Allowing it to grow taller will show off the flowers and herbs contained in the mix.

To learn more about ecolawns and grasscycling, contact Anne Donahue, Compost Specialist with the Solid Waste and Recycling Program at 682-5542.

City of Eugene Stormwater Management Program
CLEAN WATER BUSINESS

Business Partnership Program to Expand

The City of Eugene's Clean Water Business Partnership program focuses on stormwater pollution prevention. The program will soon expand to include landscape businesses. Landscape business partners will be asked to use best management practices in their work as well as help educate customers about the importance of keeping pollutants out of the storm drain.

To learn more about the program, contact Kathy Eva with the Stormwater Management Program at 682-2739 or e-mail: kathy.a.eva@ci.eugene.or.us.

Suddenly Green! What You May Not Know About Weed & Feed

Weed and feed products combine a lawn fertilizer with a weed killer. While combining two products into one may seem like a good idea, there are more problems than advantages. Here's why. Herbicides work best when grass is dormant. That means application is best done in the fall. Fertilizers, on the other hand, work best when grass is actively growing and that would typically be in the spring & summer. So depending on the time of year you apply this product, one of them is not being effective.

Why kick the weed & feed habit?

1. Weed & feed is overkill

When you use weed & feed products, you're putting herbicides on every inch of your lawn, even if you only have a few dandelions. Many professional landscapers don't like weed & feed products because they waste money by using chemicals where they aren't needed.

2. Pesticides and quick-release fertilizers harm the environment

Scientists doing water quality testing have found 2,4-D, MCPP, and dicamba – weed killers in most weed & feed products – in local and urban streams. Also common were the insecticide diazinon and several other heavily used lawn and garden pesticides. These pesticides have been found to kill and cause reproductive damage or harm fish, birds and aquatic organisms. So-called "inert" ingredients in these products are sometimes more toxic than the active ingredient. Quick-release fertilizers, when washed off the lawn by rain, increase algae growth in streams. When algae die, oxygen levels in the water decrease, killing fish and other organisms.

3. Pesticides may harm your family's health

Children are at higher risk from pesticide exposure. They are more likely to be exposed and they are especially sensitive to toxic chemicals. Some medical studies have found an increased risk of

cancer and other health problems from the use of yard and garden pesticides. In a science journal review of 98 health studies related to the use of herbicides and other pesticides, half the studies found an increased cancer risk. These and other studies raise a public health concern. In order to reduce exposure to users, the U.S. Environmental Protection Agency now requires weed and feed labels to have stronger language about protective clothing.

4. Pesticides and quick-release fertilizers may harm your lawn's health

Earthworms and other soil invertebrates are essential to healthy soil and a healthy lawn. By moving through the soil, they allow water and air to penetrate and they recycle thatch back into nutrients that the grass can use. Numerous turfgrass studies have found that the use of bug and weed killers and quick-release fertilizers greatly reduces the number of earthworms, increases thatch build-up and make the soil more acidic.

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Chemical use and disposal

Should you use pesticides or not? Today that is a big question, especially when sale (use) of organic products are at an all time high. On January 22, 2004, the Federal District Court restricted the use of 38 pesticides near salmon streams. The ruling put in place no-spray buffers of 100 yards for aerial application and 20 yards for ground and homeowner application. There is also a required point of sale warnings on products containing 7 different pesticides that have polluted urban streams. They are 2,4-D, carbyl, diazinon, diuron, malathion, triclopyr BEE, and trifluralin.

If you do use pesticides, herbicides, insecticides or fungicides, buy only what you need and carefully follow application instructions. For a booklet on alternatives to pesticides or home gardening tips call the OSU Extension Service Master Gardener's Hotline at 682-4247. Their hours are 8-12 and 1-5 Monday – Friday.

Disposal options:

To dispose of unused or unwanted garden chemicals, take them to Lane County's Household Hazardous Waste Collection Facility, located at the Glenwood Transfer Site. They are open by appointment every week. They accept all types of household hazardous waste; paints, thinners, automotive products, solvents, pool chemicals, aerosol cans, fluorescent lamps, cleaners, mercury containing products, and more. Also, Lane County holds five or six mobile collection events throughout Lane County each year, including events scheduled for 2004 in Florence, Oakridge, Junction City and Blue River.

For more information about Lane County's Household Hazardous Waste Collection Facility, or to make an appointment, call 682-4120.

Two Toxic D's: Diazinon and Dursban

Have you cleaned your garage lately? Lurking in a back corner or cupboard may be one or both of two widely used pesticides: dursban (chlorpyrifos) and diazinon.

For over 40 years, both pesticides have been popular with homeowners to kill insects in lawns, on vegetables, and fruit trees. They have also been used indoors to control termites, cockroaches, and fleas. Chlorpyrifos was also commonly used in flea collars for dogs and cats. Both pesticides have been detected in waterways, rain, and fog.

Diazinon and dursban are organophosphate pesticides that affect the nervous system. Exposure to either pesticide can be harmful to humans and studies have revealed that children are especially vulnerable. Birds and fish are also at risk; exposure can lead to immediate death.

The United States Environmental Protection Agency has ended the sale of both pesticides for residential use. The sale of pesticides containing chlorpyrifos was stopped after December 1, 2001 and the sale of diazinon ended in December, 2003.

Dursban and diazinon are found in these products:

Dursban: Chlorpyriphos Chem Tox; Dichloron LO; Empire 20; Hydro Cide Residual; Ortho Home Pest Insect Control

Diazinon: Diazinon Cit ATO Chem Knockout; Diazinon 2D Dust; Drop Dead Insect Spray; Extermo; Extermo Liquid; Spectracide

Raiding the Pantry for Alternative Pest Control

As awareness grows of the harm chemicals can do to living things and their environment, many people are looking for alternatives to traditional pest control. Did you know the secret to natural pest control may be in your kitchen cupboard? Vinegar, hot peppers, salt, onions, dishwashing soap and many other common ingredients can be combined to make natural insecticides, fungicides, and herbicides. It's easy, inexpensive, and safe! Here a few simple and effective recipes to try at home:

All-purpose bug sprays

Fill an empty spray bottle about 3/4 of the way with water, then add a few drops of Ivory liquid soap, some hot peppers (or hot pepper sauce) and some garlic. Reapply after a rain storm or every couple of weeks.

Jerry Baker, well-known celebrity gardener, goes to the kitchen for many ingredients he uses in his homemade pest killers. He creates an all-purpose garden spray by combining six cloves of chopped garlic, one small chopped onion, one teaspoon of dishwashing soap and one quart of warm water. Allow this mixture to sit overnight. Use a mist sprayer to apply to garden plants.

General Bug Killer

Blend two cups tomato leaves, 1/2 tsp. dishwashing liquid and one quart water. Put the concoction in a spray bottle and spray unwanted pests.

Slug Killer

Slugs can be controlled by leaving submerged containers of beer or grape juice in the garden. You can also kill smaller slugs that can't be handpicked by spraying garden areas with a mixture consisting of 1 1/2 cups of ammonia, one tbsp. of Murphy's Oil soap, and 1 1/2 cups of water.

Fungicides

Combine 3 tsp. apple cider vinegar, one gallon of water and a few chopped banana peels. Pour the mixture into a spray bottle and use on indoor plants. You can try it outdoors too.

Jerry Baker has also concocted a mixture that specifically targets black spot on roses. You can make this simple fungicide by mixing fifteen chopped tomato leaves and two small chopped onions with 1/4 cup of rubbing alcohol. Let the mixture steep overnight and apply to infected roses with a paintbrush or sponge.

To control powdery mildew, which is very common during our wet springs, mix 4 tbsps. of baking soda with 2 tbsps. of Murphy's Oil Soap and one gallon of warm water. Put the mixture into a spray bottle and apply to infected plants.

Weed Killer

Bring one gallon of white vinegar to a boil, add one cup of regular table salt and simmer until the salt dissolves. Cool the mixture. When cool, add eight drops of liquid detergent. (Dawn works well, but any liquid detergent will do.) Place in a spray bottle and ***carefully*** spray on weeds. This solution works best when applied to weeds on a sunny day.

Fertilizer

To make a "natural" fertilizer, mix 1 can of beer with one cup of ammonia, 1/2 cup of phosphorus-free dish soap, 1/2 cup of lawn food and 1/2 cup of molasses. This fertilizer can be mixed up in a 20 gallon hose-end sprayer and applied to lawns. It works best if applied every three weeks. (Wait for two days after mowing to apply.)

Before and after pictures show how effective plain vinegar can be as a weed killer. This weed was sprayed on a sunny day with a 5% vinegar solution.

Giant Garden Pests!

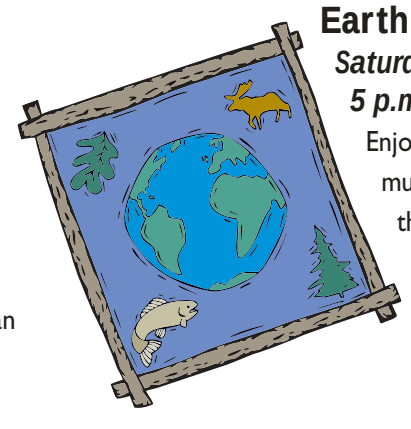
Has your garden become a smorgasbord for local deer? Try this Deer Buster Egg Tonic from Jerry Baker's *Great Green Book of Garden Secrets*!

- 2 eggs
- 2 cloves of garlic
- 2 tbsp. of Tabasco sauce
- 2 tbsp. of cayenne pepper
- 2 cups of water

Put all ingredients in a blender and puree. Let the mixture sit for two days. Pour or spray on plants you want to protect.

Diatomaceous Earth: Safe, Natural Flea and Slug Control

Diatomaceous earth is a totally safe, non-toxic substance made up of the crushed fossils of freshwater and marine organisms. Particles of diatomaceous earth, which resemble crushed glass, work by scratching through the outer waxy shell of crawling insects, causing death by dehydration. Sprinkled in carpet or directly on pets, it is especially effective in controlling fleas. It can also be used outdoors as a natural slug control.



Earth Day Celebration!

Saturday April 17th, 11a.m. – 5 p.m., Downtown Eugene

Enjoy educational booths and displays, music and entertainment throughout the day, and the Procession of All Species parade at 2:00 p.m. Call 681-4108 for information.

More Stormwater Connections

Eugene Stream Team: Hands-on projects help watershed

The Eugene Stream Team's mission is to create and support increased stewardship of Eugene's watersheds.

Grab your boots, roll up your sleeves and join like-minded individuals to help our local environment. The Eugene Stream Team has a variety of programs to choose from. Volunteers can learn about and contribute to the protection and enhancement of their urban watershed in a variety of settings using diverse skills. Volunteers participate in hands-on enhancement projects related to water quality and fish and wildlife habitat; train as trail guides and lead groups of all ages on tours of local wetlands and river systems; stencil storm drains; adopt a pond, stream or wetland; collect seeds, and learn about and tend plants at the Native Plant Nursery. No experience is necessary. All gloves, tools, and equipment are provided and knowledge is shared freely.

Native Plant Nursery: The nursery contains a holding area for salvaged plants, a grow-out site for seeds collected by volunteers, and beds which are used to grow cuttings. Stream Team volunteers plant over 2,000 plants at restoration sites within the City of Eugene each year from the nursery.

Seed collection and cleaning: In early spring, volunteers collect seeds from native vegetation on public lands (and private lands when landowners are willing). One or two mornings per week, volunteers go out with a botanist who can identify native species and their look-alike non-native species. Seeds are later cleaned in preparation for planting.

Trail guides: Since 1999, Eugene Stream Team and the local chapter of the Audubon Society have been training community volunteers to become trail guides. Trainings are offered several times per year. Trail guides generally lead field trips for elementary age students in the spring and fall. Most school trips occur mid-morning during the week for 1 1/2 hours. Free field trips are also offered to adults and families. A **Trail Guide Training**, sponsored by Eugene Stream Team and Audubon Society, will be held on April 18th, 1-4 pm. Contact Lorna Baldwin at 682-4850 to register.

Stream restoration: Stream Team volunteers have been busy restoring areas along Amazon Creek and the Willamette River.

Salmon habitat restoration in progress! Volunteers for the Eugene Stream Team plant native trees and shrubs along the Willamette River in the Whilamut Natural Area of Alton Baker Park.

You may have seen some of the changes happening just downstream from the Knickerbocker Bridge on the Willamette or downstream from Oakpatch Road along Amazon Creek. Soon there will be many opportunities at the Delta Ponds.

Stream Team offers an e-mail notification list of volunteer opportunities. E-mails average twice a month in frequency but may come in a flurry. Planting opportunities are in the fall and winter, and seed collection is in the summer. Salvage, invasive species removal, and working in the Native Plant Nursery are year-round opportunities.

To get involved, learn more about other volunteer opportunities, or schedule a field trip contact Lorna Baldwin, Stream Team Coordinator at 682-4850, lorna.j.baldwin@ci.eugene.or.us. or visit the website at www.ci.eugene.or.us/parks/stream/index.htm.

Naturescaping Workshop

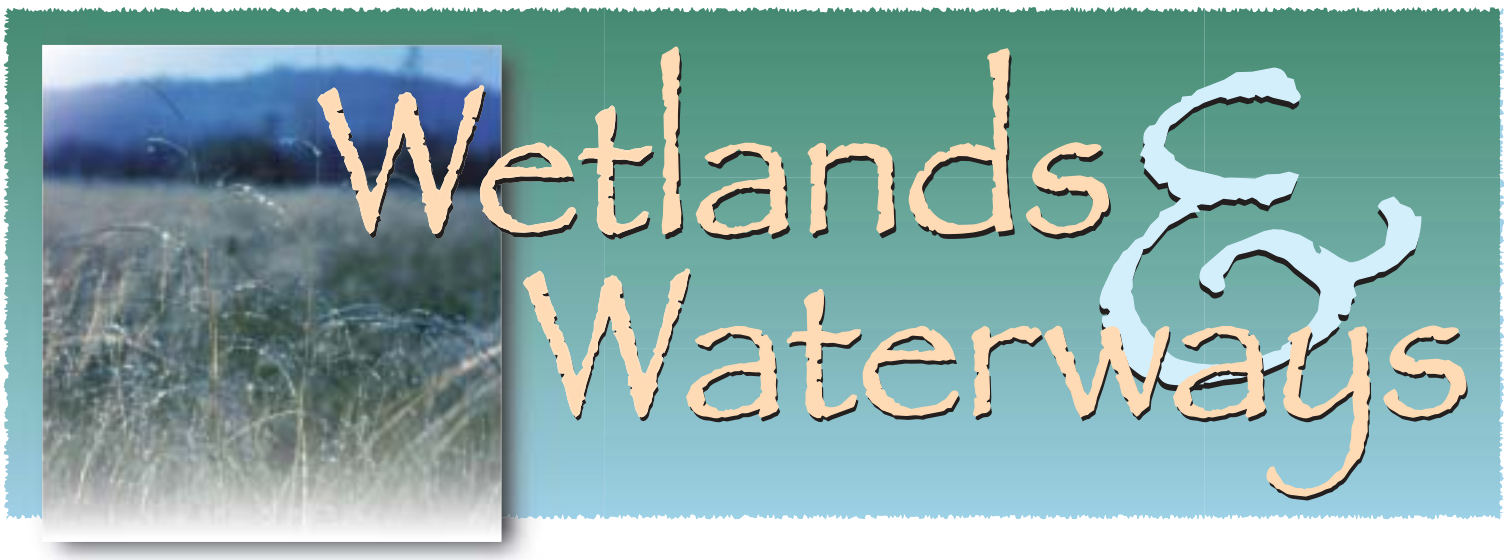
Mark your calendar for the next free ***Naturescaping for Clean Rivers Workshop*** on Sunday, April 25th 1 - 5 p.m. at the Hilyard Community Center. Call 682-4850 to register.

Salmon SPLASH! into Local Schools

Salmon play a complex role in the Northwest ecosystem. A new unit of the SPLASH! curriculum explores the relationship between salmon, streams, forests and other species. Students will learn about the factors that have contributed to the decline of salmon populations and the impact of losing a species that is key to the health of an entire ecosystem. The unit will also focus on how stormwater pollution affects salmon habitat and how specific pollutants carried into waterways can be harmful to salmon.

Salmon and the Ecosystem has been developed for fourth through eighth grade students and is offered free of charge to teachers in Eugene's 4J and Bethel School districts. The curriculum includes games and exercises that will help students understand the food chain and food web, human activities that can hurt salmon and their habitat, and salmon migration and homing instincts.

SPLASH! has been developed by the City of Eugene Stormwater Management Program. You can get more information about the curriculum by calling the City of Eugene Public Works, 682-2739.



The West Eugene Wetlands system is Eugene's largest open space area, and has resulted from the City's unique partnership with the U.S. Bureau of Land Management, The Nature Conservancy, and several other local and federal partners.

West Eugene Wetlands Education Center

The 2500 acre West Eugene Wetlands system is a living laboratory that our community can experience and enjoy. This protected system of wetlands and associated uplands helps protect water quality, alleviate potential for flooding, and provides habitat for unique Willamette Valley plants and animals. The West Eugene Wetlands system is Eugene's largest open space area, and has resulted from the City's unique partnership with the U.S. Bureau of Land Management, The Nature Conservancy, and several other local and federal partners.

Over the last several years, the West Eugene Wetlands Partnership has begun a plan to increase the number of recreational and educational opportunities in the wetlands. For example, a 2.5 mile extension of the Fern Ridge Path now meanders through Meadowlark Prairie to Greenhill Road. This path allows walkers, runners, and bicyclists to walk all the way from the Lane County Fairgrounds to Meadowlark Prairie.

New interpretive signs are currently being placed throughout the wetlands. The first installations of eight signs are along the new bike path that terminates at the Meadowlark Prairie overlook. Plans also include upgrading the currently primitive trails to accommodate wheelchairs users, but as with all these improvements, this will take both private and public funds that are not currently available, but are being sought.

The West Eugene Wetlands Education Program focuses on revealing the wonders of the wetlands to students of all ages. Currently, there are two ways for students to learn about the wetlands. West Eugene Wetland staff are available to visit classrooms to lead exploration activities about bird migration, invasive plants, and wetland basics. Wetland Discovery Field Trips place students outside in the wetlands learning environment. Students have the opportunity to participate in hands-on activities to learn about the natural and cultural resources of the West Eugene Wetlands.

The private nonprofit Willamette Resources and Educational Network (WREN) was formed in 2001 to: *"Create and support an education program and center that celebrates and encourages stewardship of the West Eugene Wetlands using resources and support from our community."*

Last May, WREN kicked off a yearlong offering of interpretive and education programs for the general public, as well as school groups with the celebration of Wetlands Month. This tremendous offering was a collaboration of local scientists, educators, artists and community volunteers. WREN will again celebrate Wetlands Month in May with activities for families, children and adults. These programs encourage the curiosity in all of us, including art in nature programs, dragonfly, butterfly, wildlife (including reptiles and amphibians) and native plant programs "Honestly, we can't keep up with the demand," says Holly McRae, WREN's environmental education specialist, "much of past and continued success rests on the generosity of the many local experts that volunteer to provide high quality programs or lead school groups.""

This summer WREN will be teaming up with the City of Eugene Kid City Summer Camp program to bring weeklong environmental education to 9-12 year olds. To learn about upcoming events in the wetlands, e-mail west_eugene_wetlands@hotmail.com and ask to be put on the mailing list or visit our website www.wewetlands.org.

Local citizens, educators, local and federal government employees are now working on the future construction of the West Eugene Wetland Education Center to house these education programs, interpretive center and regional natural history reference center. Currently, the goal is to raise about $500,000 in the next two years to begin construction of Phase 1. Completion of all three phases is anticipated within the next five years.

Camas, *Camassia quamish*

Blue dasher dragonfly

America Indian elder Frank Merrill of Eugene, from the Karuk Tribe in Northern California, performs a blessing during the dedication of the Meadowlark Prairie wetlands overlook off Greenhill Road, west of Eugene.

The Secret life of: Soil!

Hi! I'm Lily, the Pacific green tree frog. Our local waterways are home to me and many of my friends.

Some of you may wonder why a frog (who lives in water) cares about soil. The reason is quite simple: plants grown in healthy soil are able to resist disease and bugs and require fewer pesticides and fertilizers. We all know pesticides and fertilizers can harm water quality if they are carried with rainwater into local streams and rivers. So, the less we use, the better our water quality. Clean water is very important to me and my friends!

Vocabulary Word

Microorganisms:

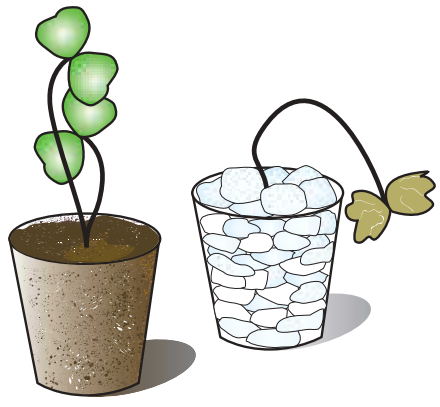
Organisms too small to be seen without the aid of a microscope.

How often do you really think about soil? We grow food in soil, we play in soil, we get soil on our shoes, and we make mud pies with soil. So, what exactly is soil? Soil is a mixture of ground up rock, decaying plants and animals, air, and water. Soil is an essential part of the earth.

Soil is dead, right? Wrong! Soil is alive with organisms that keep soil healthy and make nutrients that plants use to grow. Many organisms make up this underground living system. Some you can see; some are so small they can only be seen with a microscope. Organisms you *can* see include earthworms, arthropods, and nematodes. What you *can't* see are important microorganisms: fungi, bacteria, and protozoa.

Microorganisms are tiny, natural recyclers. They act as decomposers, breaking down organic material into nutrients that are used by plants. Although they are very small, soil microorganisms keep soil healthy and alive. And, healthy soil makes healthy plants, reducing the need for harmful chemicals to fight bugs and disease.

To prove soil is alive and full of nutrients, try this simple experiment using potting soil, cotton balls, and lima bean seeds.



What happened after the lima beans germinated in the two cups? Why are the lima beans grown in cotton balls not thriving?

You Will Need:

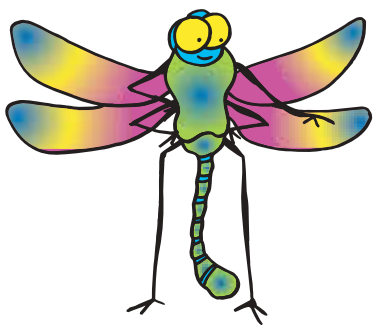
- ✔ Cotton balls
- ✔ Potting soil
- ✔ Lima bean seeds
- ✔ Water
- ✔ Three clear plastic cups
- ✔ Notebook to write observations

Procedure:

1. Fill one plastic cup half way with soil. Place a few seeds on top of the soil leaving a little space between them. Then fill the rest of the cup with soil, covering the seeds.
2. Fill the other plastic cup half way with cotton balls. Randomly place one or more seeds between the cotton balls. Fill the rest of the cup with cotton balls, again covering the seeds.
3. Fill the third plastic cup with water.
4. Carefully pour a small amount of water over the cup containing the soil. Make sure the soil is not soupy, just moist to the touch.
5. Carefully pour a SMALL amount of water over the cup containing the cotton balls and add water a little at a time. The cotton balls should just be moistened, not soaking.
6. Place the cups on a shelf or warm window ledge. (Plants do better if they are able to get some sun.)
7. Water plants carefully as needed when the soil/cotton balls are dry to the touch.
8. Observe the growth of the plants every day and write down what happens. Compare your observations to the information in the box below.

Experiment Results:

The lima beans grown in the soil should be robust and healthy. The small roots that grow into the soil absorb water along with nutrients created by the microorganisms that live in the soil. The lima beans grown on cotton balls will germinate in water, but not survive without nutrients.



Hello! I'm Dougie the dragonfly, one of Lily's friends. Take this test to find out how much you know about keeping soil healthy.

Test your knowledge about healthy soil!

Some of the things we do in our yard can harm soil microorganisms, making soil unhealthy. Other things we do will improve soil. Answer these questions to test your knowledge about healthy soils.

Will this activity harm microorganisms in soil?

1. Dumping used motor oil in the garden ☐ Yes ☐ No
2. Recycling old paint ☐ Yes ☐ No
3. Adding compost to soil ☐ Yes ☐ No
4. Pulling weeds by hand ☐ Yes ☐ No
5. Leaving grass clippings on the lawn ☐ Yes ☐ No
6. Using weed and feed on the lawn ☐ Yes ☐ No
7. Using pesticides to kill bugs on roses ☐ Yes ☐ No
8. Rotating vegetable crops in the garden ☐ Yes ☐ No

Answers:
1. Yes. Oil will smother any living organisms in the soil.
2. No. Paint is toxic; never dump it on soil!
3. No. Compost adds nutrients to soil.
4. No. This is much better than using harmful chemicals.
5. No. Grass clipping add nutrients to soil and hold in moisture.
6. Yes. Weed and feed kills good organisms too.
7. Yes. Pesticides kill soil organisms too.
8. No. Rotating crops reduces the need for chemicals.